Trend Study 25C-14-03

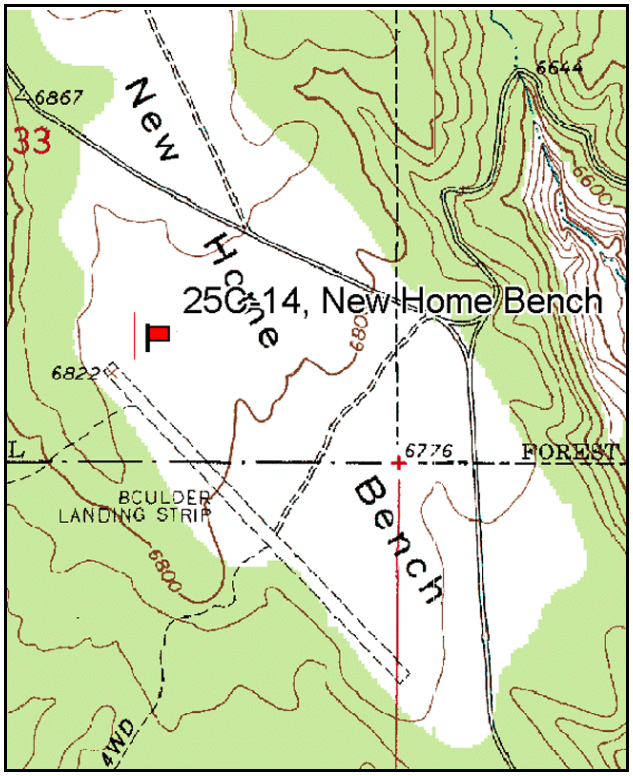
Study site name: New Home Bench . Vegetation type: Wyoming Big Sagebrush .

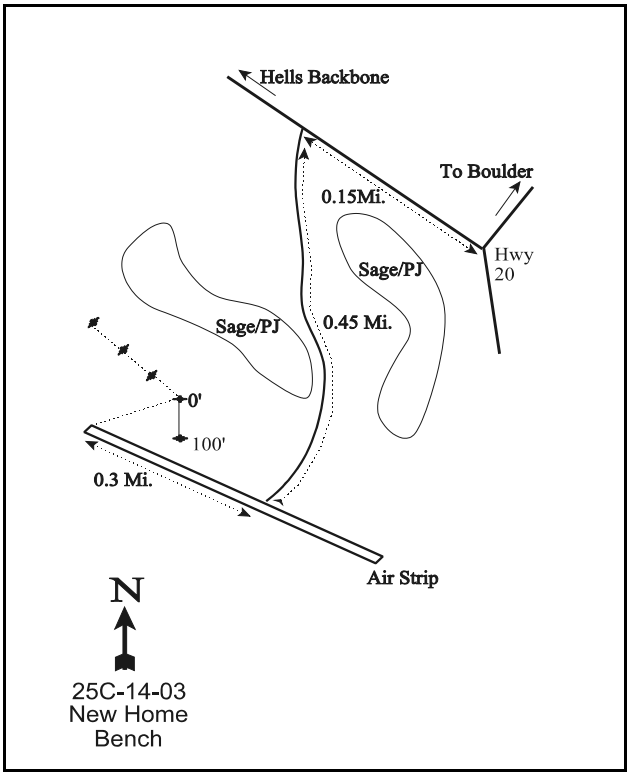
Compass bearing: frequency baseline 165 degrees magnetic. Lines 2-4 346°M.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Take SR12 southwest out of Boulder for approximately 3 miles to the top of the bench above Dry Hollow. Turn onto the Hells Backbone-Salt Gulch Road. Travel 0.15 miles northwest to a road turning off to the left. Go 0.45 miles on this road to the Boulder airstrip. Turn right and drive down the airstrip 0.3 miles. The transect starts approximately 65 paces from the end of the airstrip, bearing 86 degrees magnetic. The 0-foot baseline stake is marked by browse tag #7145.





Map Name: Boulder Town

Diagrammatic Sketch

Township 33S , Range 4E , Section 33

GPS: NAD 27, UTM 12S 4193396 N, 459012 E

DISCUSSION

New Home Bench - Trend Study No. 25C-14

The New Home Bench study site is located just north of the Boulder airport on the south side of Boulder Mountain. The sagebrush range type occupies a relatively small area, and is usually found interspersed with pinyon-juniper woodland. These sage flats, such as the one on New Home Bench, are important as deer winter ranges. The large bench where the trend study is located is nearly level with a slope of 1-2% and an east to northeast aspect. Elevation is 6,800 feet. The small drainage east of the study site drains toward the south. Pellet group data from the site in 1998 estimated deer use at 66 days use/acre (163 ddu/ha). A couple of cow pats were also encountered. Pellet group data from 2003 estimated high deer use at 95 days use/acre (235 ddu/ha). Elk use was estimated at 7 days use/acre (17 edu/ha). No sign of cattle grazing was noted in 2003.

The soil is a sandy loam which is neutral in reaction (pH 6.8). Effective rooting depth is estimated at just over 13 inches with little rock on the surface or within the profile. Soil is loose and susceptible to both wind and water induced soil disturbance. Sparse vegetation, litter, and cryptogramic cover provide some soil protection, but bare soil is abundant averaging over 50% cover since 1987. The well developed cryptogams on this site are an important factor in soil stabilization. However, cryptogamic cover is concentrated only under sagebrush canopies. Erosion is not severe, however localized soil movement is occurring and soil pedestalling is evident around shrubs.

The dominant vegetation on the site is an old stand of Wyoming big sagebrush. Density was estimated at around 4,100 plants/acre in 1998 and 2003. The stand is overly mature and has had a high proportion of decadent plants since study site establishment. Percent decadence peaked at 63% in 1991 and 91% in 2003, both drought years. Young recruitment has been good in past years but was poor in 2003 with drought. Use was moderate to heavy in 1987 and 1991 but more moderate in 1998 and 2003. Drought conditions in 2003 have caused 70% of the sagebrush sampled to display poor vigor. Decadent plants accounted for 91% of the population in 2003 and 73% of those were classified as dying (>50% crown death). This suggests a pending decline in the population due to the lack of young recruitment.

There are a few other browse species which provide some additional forage including ephedra and a few slenderbush eriogonum. Broom snakeweed, an increaser, occurs in moderately high numbers. A few stickyleaf low rabbitbrush also occur on the site. Pinyon and juniper trees are scattered on the flat. Point-quarter data from 1998 and 2003 estimated a stable population of 28 pinyon and 27 to 28 juniper trees/acre. Average basal diameter was estimated at about 3.5 inches for both species. About 1/3 of the population was in the 1 to 4 foot height class in 2003, while another 1/3 occurred in the 8 to 12 foot height range.

Density and diversity of herbaceous plants is very low. Blue grama is the only common perennial grass species with a quadrat frequency of 59% in 1991, declining to about 35% in 1998 and 2003. Bottlebrush squirreltail and needle-and-thread were moderately abundant in 1987 and 1998. The annual, sixweeks fescue was abundant in 1998 but this very low growing species provides little useful forage. Forbs are depleted and nearly absent. With drought conditions, perennial grasses declined by 52% in sum of nested frequency and average cover showed nearly a 3-fold decline in 2003.

1987 APPARENT TREND ASSESSMENT

Soil conditions are poor with abundant exposed bare ground and marginal protective ground cover. Erosion is not a major problem however due to the gentle terrain. The key browse is mostly mature and decadent stand of Wyoming big sagebrush. It shows moderate to heavy use and high decadence. Young recruitment is good however with 24% of the population consisting of young plants. Trend for sagebrush appears stable at this time. The herbaceous understory is poor with only blue grama being abundant. A few other perennial grasses occur in limited numbers including Indian ricegrass, bottlebrush squirreltail, and needle-and-thread. Forbs are

rare in their occurrence.

1991 TREND ASSESSMENT

The soil trend is considered slightly down. Basal vegetative cover did increase to 6%, and the high proportion of bare ground also increased slightly. Percent litter cover has decreased from only 28% down to 21%. Recent soil movement was detectable on the site in 1991, and washes in the area are active. There appeared to be a great deal of soil pedestalling around the sagebrush. Wyoming big sagebrush, the key browse species, remained stable in density since 1987. However, percent decadence has gone up from 39% to 63%. Seedlings were rare in 1991 but young recruitment was good. Trend is considered stable. The herbaceous understory is poor with blue grama the only abundant species. Sum of nested frequency of perennial grasses remained similar to 1991. With the exception of scarlet globemallow, none of the forbs encountered in 1987 were still growing on the site in 1991. Forbs were never abundant however and the herbaceous trend is considered stable.

TREND ASSESSMENT
soil - slightly down (2)
browse - stable (3)
herbaceous understory - stable (3)

1998 TREND ASSESSMENT

Trend for soil is up slightly due to a decline in percent bare ground and an increase in litter cover. Trend for Wyoming big sagebrush is up slightly. The increase in density is primarily due to the larger sample used in 1998, but vigor is improved and percent decadence has declined from 63% to 35%. Reproduction is also improved since 1991 with more seedlings counted in 1998. Trend for the herbaceous understory is stable but depleted. Sum of nested frequency of perennial grasses and forbs remained similar to 1991 estimates. Nested frequency of blue grama declined significantly but bottlebrush squirreltail and needle-and-thread increased significantly. The annual, sixweeks fescue, increased significantly in nested frequency and is now the most abundant grass on the site. Forbs are severely lacking.

TREND ASSESSMENT
soil - up slightly (4)
browse - up slightly (4)
herbaceous understory - stable (3)

2003 TREND ASSESSMENT

Trend for soil is stable but poor with similar ground cover characteristics compared to 1998. The one negative aspect of the soil trend is the decline in nested frequency and cover of perennial grasses. Erosion is not a problem however due to the lack of slope. Trend for Wyoming big sagebrush is down. Population density is stable for the moment but 91% of the population is decadent and 73% of those plants were classified as dying in 2003. No seedlings were encountered and young plants were rare. Use remained moderate. All of this data suggests a significant die-off of sagebrush in the future. Trend for the herbaceous understory is also down. Sum of nested frequency of perennial grasses declined 52% with a significant decline in all species except for blue grama. One good aspect of the grass component is the disappearance of the annual, sixweeks fescue. Forbs remain rare.

TREND ASSESSMENT
soil - stable (3)
browse - down (1)
herbaceous understory - down (1)

HERBACEOUS TRENDS --
Management unit 25C, Study no: 14

Type	Species	Nested Frequency				Average Cover %	
		'87	'91	'98	'03	'98	'03
G	Bouteloua gracilis	$_{b}$149	$_{b}$144	$_{a}$91	$_{a}$84	4.32	2.29
G	Oryzopsis hymenoides	$_{ab}$1	$_{b}$13	$_{ab}$6	$_{a}$-	.05	-
G	Sitanion hystrix	$_{a}$19	$_{a}$19	$_{b}$59	$_{a}$10	1.23	.08
G	Stipa comata	$_{b}$25	$_{ab}$13	$_{c}$47	$_{a}$3	1.27	.15
G	Vulpia octoflora (a)	-	$_{b}$18	$_{c}$202	$_{a}$-	8.65	-
Total for Annual Grasses		0	18	202	0	8.65	0
Total for Perennial Grasses		194	189	203	97	6.89	2.52
Total for Grasses		194	207	405	97	15.55	2.52
F	Cryptantha fulvocanescens	2	-	-	-	-	-
F	Descurainia pinnata (a)	-	-	$_{a}$5	$_{b}$18	.01	.11
F	Eriogonum cernuum (a)	-	-	-	3	-	.00
F	Eriogonum spp.	-	-	6	-	.06	-
F	Erigeron pumilus	-	-	2	-	.00	-
F	Machaeranthera canescens	4	-	-	-	-	-
F	Phlox longifolia	4	-	-	2	-	.00
F	Senecio multilobatus	-	-	-	1	-	.03
F	Sisymbrium altissimum (a)	-	-	-	1	-	.00
F	Sphaeralcea coccinea	$_{c}$9	$_{bc}$6	$_{a}$-	$_{ab}$1	-	.03
F	Unknown forb-perennial	3	-	-	-	-	-
Total for Annual Forbs		0	0	5	22	0.00	0.12
Total for Perennial Forbs		22	6	8	4	0.06	0.06
Total for Forbs		22	6	13	26	0.07	0.19

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 25C, Study no: 14

Type	Species	Strip Frequency '98	Strip Frequency '03	Average Cover % '98	Average Cover % '03
B	Artemisia tridentata wyomingensis	85	83	18.72	17.33
B	Ceratoides lanata	0	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	0	6	-	-
B	Ephedra torreyana	4	2	-	.15
B	Eriogonum microthecum	2	2	.03	.03
B	Gutierrezia sarothrae	31	24	.95	.43
B	Juniperus osteosperma	1	3	.38	.38
B	Opuntia spp.	2	0	-	-
B	Pinus edulis	0	2	-	.85
Total for Browse		125	123	20.08	19.18

CANOPY COVER, LINE INTERCEPT --
Management unit 25C, Study no: 14

Species	Percent Cover '03
Artemisia tridentata wyomingensis	9.48
Chrysothamnus viscidiflorus viscidiflorus	.03
Gutierrezia sarothrae	.33
Juniperus osteosperma	.45
Pinus edulis	1.06

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 25C, Study no: 14

Species	Average leader growth (in) '03
Artemisia tridentata wyomingensis	3.7

POINT-QUARTER TREE DATA --
Management unit 25C, Study no: 14

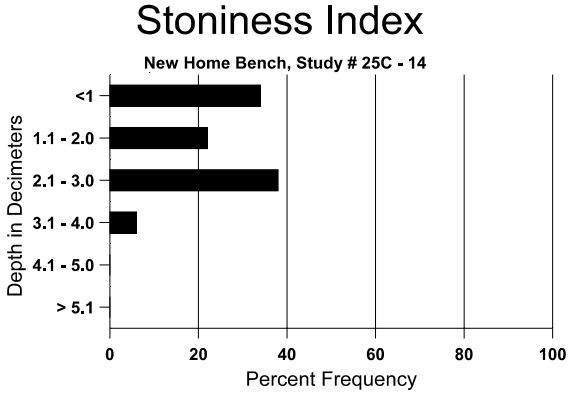
Species	Trees per Acre		Average diameter (in)	
	'98	'03	'98	'03
Juniperus osteosperma	26	28	3.7	3.4
Pinus edulis	28	28	3.4	3.5

BASIC COVER --
Management unit 25C, Study no: 14

Cover Type	Average Cover %			
	'87	'91	'98	'03
Vegetation	3.00	5.75	31.96	20.92
Rock	0	0	.22	.24
Pavement	0	.25	2.53	2.38
Litter	27.50	20.50	29.28	29.80
Cryptogams	10.00	10.75	12.31	6.17
Bare Ground	59.50	62.75	51.56	51.27

SOIL ANALYSIS DATA --
Management unit 25C, Study no: 14, Study Name: New Home Bench

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
13.3	63.7 (15.9)	6.8	69.4	12.0	18.6	1.0	12.4	112.0	0.5



PELLET GROUP DATA --
Management unit 25C, Study no: 14

Type	Quadrat Frequency '98	Quadrat Frequency '03	Days use per acre (ha) '98	Days use per acre (ha) '03
Rabbit	38	28	-	-
Cow	-	-	2 (5)	-
Elk	-	3	-	7 (17)
Deer	38	51	66 (163)	95 (235)

BROWSE CHARACTERISTICS --
Management unit 25C, Study no: 14

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis											
87	**2332**	333	566	866	900	-	29	41	39	10	29/30
91	**2366**	33	566	300	1500	-	41	38	63	35	21/28
98	**4120**	200	540	2140	1440	1240	39	10	35	6	22/32
03	**4100**	-	20	340	3740	2200	52	8	91	70	25/36
Ceratoides lanata											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**20**	-	-	20	-	-	0	100	-	0	11/5
Chrysothamnus viscidiflorus viscidiflorus											
87	**0**	-	-	-	-	-	0	0	0	0	-/-
91	**0**	-	-	-	-	-	0	0	0	0	-/-
98	**0**	-	-	-	-	-	0	0	0	0	-/-
03	**120**	-	40	60	20	-	0	0	17	0	11/10
Ephedra torreyana											
87	**33**	-	33	-	-	-	100	0	0	0	-/-
91	**66**	-	-	66	-	-	100	0	0	0	9/6
98	**180**	-	40	140	-	-	44	56	0	0	11/12
03	**60**	-	-	40	20	-	0	33	33	0	16/17
Eriogonum microthecum											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**40**	-	40	-	-	-	0	0	-	0	-/-
03	**40**	-	-	40	-	-	0	0	-	0	9/10

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae											
87	**0**	-	-	-	-	-	0	0	0	0	-/-
91	**0**	-	-	-	-	-	0	0	0	0	-/-
98	**2720**	360	800	1900	20	-	0	0	1	0	8/9
03	**1180**	-	320	780	80	480	0	0	7	2	9/11
Juniperus osteosperma											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**66**	-	66	-	-	-	100	0	-	0	-/-
98	**20**	60	20	-	-	-	0	0	-	0	-/-
03	**60**	-	40	20	-	-	0	0	-	0	-/-
Opuntia spp.											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**133**	-	133	-	-	-	0	0	-	0	-/-
98	**80**	-	-	80	-	-	0	0	-	0	2/7
03	**0**	-	-	-	-	-	0	0	-	0	-/-
Pinus edulis											
87	**66**	33	33	33	-	-	0	0	-	0	118/98
91	**66**	33	-	66	-	-	0	0	-	0	152/86
98	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**40**	-	20	20	-	-	0	0	-	0	-/-